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ENTOMOLOGICAL FACTORS AFFECT SALVAGE MARKING OF FIRE-INJURED PONDEROSA PINE

The results of a study of 148 selected fire-injured trees recently completed by the Bureau of Entomology on the site of the Sugar Hill fire of July, 1929, in the Modoc National Forest, California, may prove of considerable aid in marking fire-injured trees for salvage. The four-year record taken during the period of 1929-1932 covers the time of readjustment and recovery following the fire injury; and although the stand remaining after any fire will present conditions peculiar to that particular situation and will require a change in detail, some conclusions resulting from the study may be of general application.

Mortality of fire-injured trees due to insect attack was found to be greatest during the first and second years following the season in which the fire occurred. A resumption of normal conditions occurred during the third year after the fire.

Mortality due to insects, largely attributable to the western pine beetle, Dendroctonus brevicomis Lec., varied significantly with the amount of foliage injury and more particularly with the amount of cambium injury caused by the fire. When foliage injury alone occurred, trees having 0 to 25 per cent of the foliage injured lost only 8.7 per cent of the total number of trees in that class, while those having the same amount of foliage injury but relatively heavy cambium injury suffered a 10.0 per cent loss. In the group of trees with 25 to 50 per cent foliage injury, those without heavy cambium injury lost 3.6 per cent, while those with moderate to heavy cambium injury suffered a loss of 13.3 per cent of the total. In the group with 50 to 75 per cent foliage injury the loss was 18.2 per cent for those without cambium injury and 37.5 per cent for those with that injury. The most severely injured group studied--that having 75 to 100 per cent of the foliage and a small proportion of the buds killed--lost 19.2 per cent of the total number of trees in the class, while those with cambium injury in addition to the foliage injury lost 72.2 per cent.

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The types of fire-injured trees that should be marked for salvage on any given fire area will depend to a large extent on the material that is left on the area. Trees that have suffered 100 per cent defoliation, and in addition have had most of the buds killed, will of course subcumb to the effects of this injury without the aid of insects, and should be salvaged. Those trees that have suffered no fire injury should not be cut unless the lumbering operation is directed toward harvesting the stand in addition to the salvage of injured material. Fire-injured trees that might survive if insects do not intervene and kill the tree have, according to the results of the study, different degrees of susceptibility to insect attack. Available information concerning this susceptibility of the various types of fire injury indicates the relative probability of recovery without insect attack to be about as follows, the list progressing from the least susceptible types to the more susceptible types:

1. 0 to 25 per cent defoliation, no or slight cambium injury
2. 25 to 50 per cent defoliation, no or slight cambium injury
3. 0 to 25 per cent defoliation, moderate to heavy cambium injury
4. 25 to 50 per cent defoliation, moderate to heavy cambium injury
5. 50 to 75 per cent defoliation, no or slight cambium injury
6. 75 to 100 per cent defoliation, no or slight cambium injury
7. 50 to 75 per cent defoliation, moderate to heavy cambium injury
8. 75 to 100 per cent defoliation, moderate to heavy cambium injury

The results of the study indicate that although the types of fire-injured trees that should be salvaged depend to a great extent on the severity of the injury and the number of trees left on the area, in general it would pay to salvage the following, as the chances are great that they will succumb to insect attack if not salvaged:

1. Trees having over 50 per cent defoliation and moderate to heavy cambium injury in addition
2. Trees having 75 to 100 per cent foliage injury and no or slight cambium injury

The salvage of trees having 50 to 75 per cent foliage injury but no or slight cambium injury, and 25 to 50 per cent foliage injury with moderate to heavy cambium injury, would depend on the number of trees it is wished to leave for reseeding the area. Unless an unusually heavy stand of fire-injured trees in the less seriously injured groups is left by the fire, it would not pay to harvest individuals in those groups.

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